

## **REMARKS/ARGUMENTS**

### **Office Action Summary**

Claims 1-22 are pending in the application. The Examiner has entered a Requirement to Restrict the claimed invention to one of two groups of claims under 35 U.S. C. § 121. The Applicant provisionally elected Group I (claims 1-10 and 21) during a teleconference with the Examiner on Oct. 14, 2004. Thus, Group II (Claims 11-20 and 22) has been withdrawn from consideration in the Oct. 18, 2004 Office action, which addresses the Group I claims only. Claims 6 and 21 stand rejected under 35 U.S.C. § 112, 2<sup>nd</sup> paragraph as being indefinite for failure to particularly point out and distinctly claim the invention. Claims 1-10 and 21 stand rejected under 35 U.S.C. § 102(b) as being anticipated by US patent 5,323,391 (Harrison). Claims 4-5 and 9-10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Harrison. Applicant is unaware of any other rejections or objections pending in the application.

### **Requirement to Restrict**

In response to the Examiner's Requirement to Restrict the invention to either Group I, (Claims 1-10 and 21) or Group II, (Claims 11-20 and 22), the Applicant hereby affirms the election, without traverse, of Group I. The Group II claims are hereby withdrawn from consideration in this Application. Applicant reserves the right to prosecute the non-elected Group II claims in a Divisional application, claiming the filing date priority of the present Application.

### **Rejections under § 112 – Indefiniteness**

The rejection noted that Claim 6 lacked antecedent basis for the limitations “said transform resolution”, “said transform decimation [rate]”, and “said filter decimation rate”. Applicant has amended Claim 6 to clarify these terms so as to clearly identify the antecedent basis for each of these terms.

The rejection noted that Claim 21 lacked antecedent basis for the limitations “the greatest common divisor”, and “the filter”. Applicant has amended Claim 12 to clarify these terms so as to clearly identify the antecedent basis for each of these terms.

Applicant believes that Claim 6 and Claim 21 are now in full compliance with § 112 requirements. Reconsideration by the Examiner is courteously solicited.

### **Rejections Under § 102(b) – Anticipated by Harrison**

As articulated in the “Description of the Related Art” section of the present application, the prior art appreciated the constraints placed on the input channel frequency spacing, commutator rate, and composite signal sampling rate:

Previously, those skilled in the art have understood that there were various constraints placed on the relationship between the input sampling rate, the sub-channel frequency spacing, and the output sampling rate. These constraints have been considered problematic respecting optimum system design, especially where maximum performance in marginal signal conditions were sought.

Paragraph [3]. A particular problem was that the commutator position had to be synchronized with selected phases of the filter impulse response. The inventor of the present application is also the inventor of US patent 6,134,268, which advanced the art in that it teaches the decoupling of the commutator position from the phase of the filter. See Paragraph [5] of the present application:

The ‘268 patent teaches a multiple channel polyphase filter that includes a processing system for accepting and processing ‘M’ input channels of data, each sampled at an input sampling rate, wherein ‘M’ is a positive integer. The processing system is programmed to provide a commutator for the multiple channel polyphase filter, wherein the position of the commutator is decoupled from the phase of a filter impulse response selected for the position, thereby allowing the multiple channel polyphase filter to be operated at a sampling rate that is a non-integer multiple of the input sampling rate.

However, prior to the novel teachings of the present Application, a significant design limitation problem still remains in the art, namely:

While [the prior art teaches] the decoupling of the input sampling rate from the output sampling rate, each still suffers from a limitation defining the sub-channel frequency

spacing by a fixed relationship between the input sampling rate and output sampling rate. Thus, even in view of the teachings of McCoy in the '268 patent, communication system designers are faced with a constraints on sub-channel spacing that is often times unable to deliver optimum performance in practical applications.

Paragraph [5], lines 9-14 (emphasis added).

The novel teachings of the present application are clearly articulated in every remaining independent claim, including Claim 1, Claim 6 and Claim 21, which provide, *inter alia*, a commutator that fractionally samples the plurality of filter signals at a rate defined by the ratio of the frequency spacing and the greatest common divisor between the composite sampling rate and the frequency spacing (emphasis added). Under these teachings, designers are now able to select a base-band signal frequency spacing tailored to system requirements and real-world constraints.

Applicant hereby respectfully traverses the rejection of Claims 1, 6, and 21 under 35 U.S.C. § 102(b) because Harrison fails to teach or suggest, and in fact teaches away from, the use of a commutator that fractionally samples the plurality of filter signals at a rate defined by the ratio of the frequency spacing and the greatest common divisor between the composite sampling rate and the frequency spacing, as claimed in every independent claim of the present application. In fact, the stated reasons for rejecting these claims (found on page 4 of the Office action) mischaracterizes the claimed relationship by concluding that "a commutator distributes portions (fractions) of filtered signals, such that ... each of the N filters receives portions of the digitized signal at a rate defined by  $F_s/N$ ", where  $F_s$  is the frequency spacing and N is the number of channels. This relationship is a rigid constraint, and illustrates a problem of the prior art that the present invention seeks to overcome, as noted above.

Now considering the particular teachings of Harrison, Harrison is silent on the concept of enabling flexible selection of the base-band frequency spacing. Rather, Harrison provides the basic relationship at Col. 6, lines 43-52:

The commutator 130 distributes portions of the digitized signal 128 to four filters 132, 134, 136, and 138 such that if commutator 130 is operating at a first sampling rate ( $F_s$ ), then each of the  $N$  filters receives portions of the digitized signal 128 at a second sampling rate ( $F_s/N$ ) where  $N$  is the number of filters to which the commutator 130 operatively couples the digitized signal 128 (as previously noted  $N$  also corresponds to the number of channels in the digitized signal 128).

This statement merely provides that the samples are divided equally among the number of channels.

In fact, respecting designing a system for flexible selection of base-band frequency spacing, Harrison teaches away, urging that the filter designs be optimized for other benefits:

In the preferred embodiment transmitter structure, the  $N$  interpolating pre-filters 308, 310, 312, and 314 preferably are designed with respect to at least one signal characteristic including: optimum selectivity, controlled phase response, and controlled amplitude response.

Col. 13, lines 57-62. Also in Col. 14, lines 3-59, Harrison discusses the filter and commutator relationship, never mentioning the need or possibility of flexibility in input channel spacing. Even further, at Col 15, line 58 through Col. 16, line 9, Harrison states:

The outputs 342, 344, 346, and 348 (i.e., post-conditioned digitized information signals 342, 344, 346, and 348) of the respective modified CIC post-filters 334, 336, 338, and 340 form the inputs to a commutator 350. Commutator 350 operatively couples the modified CIC post-filter outputs 342, 344, 346, and 348 to a digital-to-analog (D/A) converter 354 through commutator 350 output 352. The commutator 350 commutates portions of each of the post-conditioned digitized information signals 342, 344, 346, and 348 together to form a composite digitized information signal 352' (shown in graphical form in FIG. 5) which is output on commutator 350 output 352.

The composite digitized information signal 352' is converted by the digital-to-analog (D/A) converter 354 into a composite analog transmission signal 356 (i.e., a baseband electrical signal 356). Subsequently, the baseband electrical signal 356 is filtered by a low pass filter 358 to eliminate undesired frequency components into a conditioned baseband electrical signal 360.

It should be noted, again, no mention or discussion of the claimed concepts of the present invention. Furthermore, Harrison is processing the composite signal through a digital-to-

analog converter, for ultimate broadcast as an analog signal, which dictates a completely different set of system issues as compared to a digital QAM system, as the illustrative embodiment of the present invention contemplate.

Thus, the Applicant submits that Harrison fails to teach or suggest the aforementioned claim limitations, teaches away, and a rejection in view of Harrison is not sustainable.

#### **Rejections Under § 103(a) – Obvious in View of Harrison**

The § 103 rejections are obviated in view of the failure of the §102 discussions above.

#### **Other Rejected Dependent Claims**

It is well settled law that since dependent Claims 2-5 and 7-10 depend from allowable independent claims, then the dependent claims are also in condition for allowance.

#### **References Cited But Not Relied Upon**

Applicant notes the references cited by the Examiner but not relied upon in any of the rejections.

#### **Conclusion**

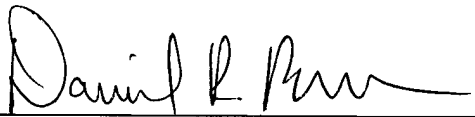
The foregoing is submitted as a full and complete response to the Office Action mailed October 18, 2004. The Applicant believes that the same places the present application in condition for allowance. Reconsideration by the Examiner and allowance of the claimed invention is hereby courteously solicited.

Since the total number of claims in the Application has been reduced, it is Applicant's belief that all fees in the case have been previously paid, except for the

Extension of Time fee, which is enclosed herewith. In the event that the Examiner determines otherwise, the that Commissioner is hereby authorized to charge such additional fees, excluding the Issue Fee, or credit any overpayment to Daniel R. Brown Deposit Account No. 501507.

Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

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